

“A Place of Excellence”

ELECTRICAL INFRASTRUCTURE MAINTENANCE POLICY

<u>APPROVED/REVIEWED</u>	<u>COUNCIL MEETING DATE</u>
Approved	31 May 2017

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EXECUTIVE SUMMARY

This document sets out the Electrical Maintenance Policy of the Drakenstein Municipality Electrotechnical Engineering Department Assets.

This policy is prepared in a format and content to align it with both:

- The NERSA license conditions
- The recommended “National Rationalized Specification NRS 082:2014” developed to address all statutory requirements, the planned maintenance of all electrical related assets, and ensure a safe environment for operators and public.

It shall support the integrated asset management platforms, linking geographic information, asset age, reliability, performance and financial systems, as and when these are developed and commissioned.

The Policy will be supported by a Maintenance Plan comprising various separate documents compiled for specific activities, procedures, training, maintenance program frequencies, and interfaces with the integrated asset management software system.

1. OBJECTIVES OF DRAKENSTEIN ELECTRO TECHNICAL ENGINEERING MAINTENANCE POLICY

The objectives of the Drakenstein Electrical Maintenance Policy are:

1. To ensure the proper maintenance of the Electricity infrastructure assets of the municipality as captured in the Asset Register of Drakenstein Municipality.
2. To benchmark the maintenance management approach of Drakenstein Municipality in the relevant Government guidelines.
3. The policy will only apply to the ongoing maintenance of infrastructure assets, and excludes any capital renewal expenditure.
4. The policy will be reviewed as required..
5. The policy will be implemented in a phased manner and according to the availability of budgeted funds..
6. To optimize the maintenance of the electricity distribution network assets for a minimum lifecycle cost;
7. To ensure a sustainable delivery of the service to the communities.
8. To protect the Council's capital investment.
9. To enhance the reliability of the network.
10. To avoid costly power outages.
11. To meet the requirements of consumers, internal stakeholders and legal authorities;
12. To comply with the obligations under which this authority is licensed to operate the electricity networks in its licensed distribution area.
13. To ensure that the policy document is aligned with the recommendations of the National Rationalized Specification NRS 082:2014 Recommended Maintenance Policy for Electricity Networks.

2. BACKGROUND

- 2.1 The Asset Management Policy of Drakenstein Municipality describes the procedures for the:
- a. proper recording of assets from authorisation to acquisition and to subsequent disposal,
 - b. providing for safeguarding procedures,
 - c. setting proper guidelines as to authorised utilisation,
 - d. and prescribing for proper maintenance.
- 2.2 Paragraph 11.20 of the Asset Management Policy also states that “Every Executive Manager” shall be directly responsible for ensuring that all assets are properly maintained and in a manner which will ensure that such assets attain their useful operating lives”.
- 2.3 Whilst the policy therefore captures a mandate for the maintenance of the infrastructure assets of the municipality, there is a need to further articulate this mandate based upon leading practice and applicable Government guidelines.
- 2.4 This maintenance management policy therefore represents the approach to be followed by the Directorate Infrastructure – Electro Technical Engineering Department to comply with the Overall Asset Management Policy of Drakenstein Municipality.

3. ABBREVIATIONS

Term	Description
CMMS	Computerised Maintenance Management System
DPLG	Department of Provincial & Local Government, now the Department of Cooperative Government and Traditional Affairs (COGTA)
EAM	Enterprise Asset Management System
EMIS	Consumer Complaints System
IEC	International Electrical Commission
IIMM	International Infrastructure Management Manual (2006)
HV	Voltage equal or greater than 44 kV AC
KPI	Key Performance Indicator
LV	Network Voltage between 50 and 1000V AC
MFMA	Municipal Finance Management Act
MTBF	Mean time between failures (for a particular type of item)
MV	Network Voltage greater than 1000V AC and less than 44 kV AC
MTTR	Mean time to repair (for a particular type of item)
NIMS	National Infrastructure Maintenance Strategy
O&M	Operation and maintenance
OEM	Original equipment manufacturer
QA	Quality assurance
RCM	Reliability centred maintenance
SOP	Safe operating procedure or standard operating procedure

4. DEFINITIONS

Term	Description
Asset Life-Cycle	The cycle of activities that an asset goes through – including planning, design, initial acquisition and/or construction, cycles of operation and maintenance and capital renewal, and finally disposal.
Availability	The proportion of total time that an asset is capable of performing its intended functions.
Benchmarking	The process of comparing the performance of Drakenstein Municipality with other municipalities, as well as leading practice in order to identify performance gaps.
Competent person	Person who is able to carry out the designated functions
Condition-based / predictive maintenance	Maintenance performed as a result of the condition of an asset. Condition based maintenance is a planned maintenance activity.
Condition-based maintenance	Maintenance done based on information from tests which predict when maintenance is necessary, rather than on time in service or number of operations
Corrective maintenance	Maintenance actions performed as a result of failure of an asset including the modification or re-design of the asset.
Corrective maintenance	maintenance carried out after fault recognition and intended to put an item into a state in which it can perform a required function (IEC)
Deferred maintenance	Maintenance activities that is postponed with valid reason. .
Funding	Funds as approved on the financial years OPEX budget for Electrical maintenance activities.
Inspection	Visual or audible (or both) examinations that can be assisted by mechanical or electrical (or both) means, that will detect obvious unsatisfactory conditions or discrepancies (IEC modified)
Item	Any part, component, device, subsystem, functional unit, equipment or system that can be individually considered (IEC)
Life cycle cost	Net present value of the sum of all the direct and indirect costs incurred to acquire, install, commission, operate, maintain, decommission and dispose an item throughout its life NOTE The maintenance component of the life cycle cost should include the costs of risk, spares, labour, maintenance facilities and equipment, transport, site establishment and any special training.
Life cycle items	Primary items and all other network items which together account for 80 % of the sum of all life cycle costs
Maintenance	All actions necessary for retaining an asset as near as possible to its original condition, excluding rehabilitation or renewal.

Term	Description
Maintenance	Combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state in which it can perform a required function (IEC)
Maintenance / Refurbishment	Actions that will restore or maintain the originally assessed future economic benefits or service potential that an entity can expect from an asset and is necessary for the planned life to be achieved.
Maintenance philosophy	System of principles for the organization and execution of the maintenance (IEC)
Maintenance plan	Information, policies and procedures for the optimal maintenance of an asset or group of assets
Maintenance policy	General approach to the provision of maintenance and maintenance support based on the objectives and policies of owners, users and customers (IEC)
Maintenance standards	The standards set for the maintenance service, usually contained in preventative maintenance schedules, operation and maintenance manuals, estimating criteria, statutory regulations and mandatory requirements, in accordance with the maintenance outcomes.
Modifications from manufacturers	Changes made to an item to incorporate developments after manufacture
Operation	The process of utilising an asset which will consume resources such as manpower, energy, chemicals and materials.
Overhaul	Work done with the objective of repairing or replacing parts which are found to be out of tolerance by inspection, tests, examination, or as required by the manufacturer's maintenance manual, in order to restore the item to an acceptable condition
Planned maintenance	Planned maintenance falls into three categories: 1. Periodic – Activities necessary to ensure the reliability or to sustain the design life of an asset. This includes the regular services required for certain assets. 2. Predictive – Condition monitoring activities used to predict failure 3. Preventative – Maintenance that can be initiated without routine or continuous checking and is not condition-based.
Preventive maintenance	Maintenance carried out at predetermined intervals or according to prescribed criteria and intended to reduce the probability of failure or the degradation of the functioning of an item (IEC)
Pure risk	Risk which results only in loss, damage, disruption or injury with no potential for gain, profit or other advantage
Redundancy	Existence of more than one means for performing a required function (IEC)
Refurbishing	Reinstatement of items to their original condition and intended performance with consideration for cost and current technology for the purpose of extending the plants useful life expectancy
Reliability Centred Maintenance	A structured process to determine the maintenance strategies required for an asset to ensure that it continues to fulfil its intended functions within the current operating context.

Term	Description
Repair	That part of corrective maintenance in which manual actions are performed on the item
Retrofit	Modifications done to an item to incorporate improvements in design to ensure enhanced operating performance
Risk	Chance of loss, or the probability that an undesired event may occur, multiplied by the cost of that event if it does occur
Risk management	Managerial function which has the objective of protecting people, assets and profits of a business, by eliminating or minimizing the potential for loss from pure risk and the provision of funds to recover from losses that do occur
Routine maintenance	Day-to-day operational activities to keep the asset operating and which form part of the annual operating budget.
Routine test	Activity to determine the status, calibration and functionality of an asset or component of an asset
Run-to-Failure	A maintenance strategy where no routine maintenance is performed and the asset is used until it fails. or Failure of an item, which has intentionally not been subject to preventive maintenance
Service maintenance	Service undertaken seasonally or annually to enable the required level of service to be delivered. Service maintenance is a type of planned maintenance activity.
Unplanned maintenance	Corrective work required in the short-term to restore an asset to a working condition.

5. STATUTORY AND REGULATORY FRAMEWORK

5.1 In addition to the Statutory and Regulatory Framework contained in the Asset Management Policy, the following documents are relevant, and were used as key inputs for this policy:

- a. MFMA Local Government Capital Asset Management Guideline published by the National Treasury Department (2008).
- b. DPLG “Guidelines for Infrastructure Asset Management in Local Government” (2007).
- c. NIMS, approved by the National Cabinet (2006).
- d. International Infrastructure Management Manual co-authored by Institute of Municipal Engineering of Southern Africa IMESA (2006).

5.2 The Occupational Health and Safety Act (Act 85 of 1993) and regulations shall be complied with.

5.3 NERSA - National Energy Regulator

5.4 Distribution License

6. COMPILATION OF MAINTENANCE MANAGEMENT PLANS

6.1 In terms of the Maintenance Management Policy, Maintenance Management Plans will be compiled for all services included under the policy. The maintenance Management Plans will address the following 5 aspects:

- a. Establishment of asset maintenance operational plans,
- b. Preparation of asset maintenance budgets,
- c. Establishment of an asset maintenance organisational structure,
- d. Establishment of asset maintenance systems,
- e. Establishment of asset maintenance performance norms and standards and reporting mechanisms.

6.2 Sections 7 to 11 provide details of the contents of the Maintenance Management Plans for each of the above 5 aspects.

7. ESTABLISH ASSET MAINTENANCE OPERATIONAL PLANS

7.1 Asset maintenance operational planning will be undertaken for all assets covered by this policy with due consideration of the following:

- a. Definition of maintenance outcomes
- b. Conducting a maintenance analysis for all infrastructure assets, including:
 - Identification of all assets
 - Identification of critical assets based upon the risk of failure to the municipality
 - Analysing the maintenance options and determining the preferred option in terms of the lowest life-cycle cost.
- c. Development and implementation of a maintenance operational plan.
- d. Analysis of asset performance

7.2 Maintenance outcomes

- a. Maintenance outcomes must be agreed and documented for every service.
- b. The maintenance outcomes must be documented for each of the following categories:
 - Statutory compliance, e.g. adherence with outflow quality requirements.
 - Availability of the service, e.g. time taken to restore service after a disruption.
 - Reliability of the service, e.g. the number of times within a period that consumers do not have access to the service.
 - Cost of maintenance.
 - Risk management.
- c. The maintenance outcomes defined will be based upon various documents adopted by Drakenstein Municipality, such as the various Consumer Service Charters.

7.3 Maintenance analysis

a. Identification of assets

- The existing infrastructure asset register will be used as the basis for the identification of all assets, and care will be taken to update the register to reflect any new assets created, retired or changed in any way.
- Assets will be grouped into categories for which the maintenance actions are similar.

b. Identification of critical assets based upon the risk of failure to the municipality

- Assets will be evaluated to determine the consequence of failure with regards to the following impacts:
 - i. Environmental impact
 - ii. Public health & safety impact
 - iii. Financial impact
 - iv. Service delivery impact
- The impact with regards to each of the criteria will be rated using a 5 point scale.
- The individual ratings will be combined into a combined rating, which will be used to identify the relative criticality of maintaining specific assets.

c. Analysing the maintenance options and determining the preferred option in terms of the lowest life-cycle cost.

- A maintenance strategy will be selected for each of the asset groups defined in 7.3 (a) 2.

7.4 Maintenance operational plan development

a. The maintenance activities for each asset group defined will be combined in an activity maintenance plan that will list the following:

- Description of the asset in sufficient detail for the accurate identification of the asset
- Description of the type of activity to be performed, e.g. testing, inspection, oil change etcetera.
- The criticality of the activity.

- The base period of the activity, e.g. monthly, annually etcetera.
- b. Maintenance activities recorded in existing documents of Drakenstein Municipality will be incorporated into the activity list. These include:
- Activities recorded in current checklists and operating manuals

7.5 Analysis of asset performance.

- a. Drakenstein Municipality will use tools to monitor the performance of assets, where it is appropriate for such tools to be employed. These could include:
- Root Cause Analysis tools to assess the underlying reasons for asset failure.
 - Undertaking Reliability Maintenance assessments.

8. PREPARATION OF ASSET MAINTENANCE BUDGETS

- 8.1 The costs associated with the maintenance activities in the maintenance activity plan must be calculated.
- 8.2 The individual maintenance activity costs must be summarised per department and used to inform the required maintenance budgets.
- 8.3 Where available maintenance budgets are inadequate the criticality of the individual activities will be used to prioritise the maintenance actions to be performed.
- 8.4 Maintenance activities that cannot be funded will be classified as deferred maintenance and recorded as such.
- 8.5 Expenditure on maintenance will be recorded against the assets, facilities and cost centres where the cost is incurred.

9. ESTABLISHMENT OF AN ASSET MAINTENANCE ORGANISATIONAL STRUCTURE

- 9.1 The maintenance activity schedule will be used to inform the maintenance organisational structure required to perform the critical work to be executed.
- 9.2 The maintenance activity schedule will also be used as the basis to determine the tools and other equipment required to perform the required maintenance.
- 9.3 The outsourcing or use of alternative delivery mechanisms to perform maintenance tasks, or groups of maintenance tasks, must be considered as an alternative for the creation of in-house capacity.

10. ESTABLISHMENT OF ASSET MAINTENANCE SYSTEMS

- 10.1 The maintenance activities will be scheduled and controlled using an appropriate system(s), such as a CMMS.
- 10.2 The maintenance system(s) must include the following functionality:
 - a. Recording of progress against activities and activities closed or re-programmed.
 - b. Recording of maintenance costs, time and other resources consumed against assets and facilities.
 - c. Include links to the financial management system so that reconciliation of maintenance budgets can be done.
 - d. Built-in maintenance analysis tools or ability to export information to other applications, to enable maintenance analyses to be undertaken.
 - e. Analysis of asset performance to be used as an input to maintenance planning.
- 10.3 A link will be established between the maintenance management system and the consumer complaints system (EMIS), which is one of the main originating points for unplanned maintenance activities.

11. ESTABLISHMENT OF ASSET MAINTENANCE PERFORMANCE INDICATORS AND REPORTING MECHANISMS

- a. Appropriate KPI's will be identified and used to monitor the maintenance performance of Drakenstein Municipality.
- b. The maintenance management KPI's will be drawn from the Service Delivery & Budget Implementation Plan and Performance Management System of Drakenstein Municipality, where possible.
- c. The network performance is annually reported to NERSA and considered for compliance with terms of the Electricity Distribution License of Drakenstein Municipality.

12. ELECTRICITY NETWORK

12.1 DESCRIPTION

The Drakenstein Electricity Network comprises of:

- 66 kV and 11 kV intakes from Eskom.
- 66kV and 11kV electricity distribution networks and plant in the licensed distribution area.

Eskom networks in Drakenstein Municipal Area:

- Eskom supplies large areas of Rural Drakenstein and the hamlets of Gouda, Hermon and Saron. This is excluded.

Distribution outside Drakenstein Municipal boundaries:

- Drakenstein Municipality Electricity Department supplies power to the Stellenbosch municipal area at Pniel and Johannesburg

12.2 INFRASTRUCTURE

The network comprises of:

- Overhead lines (HV, MV, LV)
- Underground Cables (HV, MV, LV)
- Transformers (HV/MV, MV/LV)
- Mechanical Switchgear (Primary and secondary)
- Public Lighting

- Monitoring and control equipment
- Essential services Standby Generator installations.

13. NORMATIVE REFERENCES

The following documents are referenced in NRS 082:2014-Recommended Maintenance Policy for Electricity Networks.

Document	Description
NER Power Quality Directive;	The NER Power Quality Directive was developed by the National Electricity Regulator and is available on their website www.nersa.org.za
NRS 047-1	Electricity supply – Quality of service. – Part 1: Minimum standards.
NRS 047-2	Electricity supply – Quality of service. – Part 2: Reporting guidelines
NRS 048-2	Electricity supply – Quality of supply – Part 2: Voltage characteristics, compatibility levels, limits and assessment methods
NRS 048-4	Electricity supply – Quality of supply – Part 4: Application practices for licensees
NRS 048-6	Electricity supply – Quality of supply – Part 6: Measurement and reporting of medium voltage network interruption performance
NRS 048-7	Electricity supply – Quality of supply – Part 7: Application practices for end-customers
NRS 048-8	Electricity supply – Quality of supply – Part 8: Measurement and reporting of extra high voltage (EHV) and high voltage (HV) network interruption performance
NRS 048-9	Electricity supply – Quality of supply – Part 9: Load reduction practices, system restoration practices, and critical load and essential load requirements under system emergencies.
NRS 089-1	Maintenance of electricity networks – Part 1: Underground distribution systems
NRS 089-2-1	Maintenance of electricity networks – Part 2: Overhead distribution systems –Section 1: Overhead power lines.
NRS 089-2-2	Maintenance of electricity networks – Part 2: Overhead distribution systems –Section 2: Inspection and supplemental treatment of treated wood utility poles
NRS 089-2-3	Maintenance of electricity networks – Part 2: Overhead distribution systems –Section 3: The manual replacement of a rotten wooden pole structure
NRS 089-2-4	Maintenance of electricity networks – Part 2: Overhead distribution systems –Section 4: Clearing and maintenance of servitude roads.
NRS 089-2-5	Maintenance of electricity networks – Part 2: Overhead distribution systems –Section 5: Insulators
NRS 089-3-1	Maintenance of electricity networks – Part 3: Substations – Section 1: General
NRS 089-3-2	Maintenance of electricity networks – Part 3: Substations – Section 2: Power transformers, circuit-breakers, isolators and instrument transformers

Document	Description
NRS 089-3-3	Maintenance of electricity networks – Part 3: Substations – Section 3: Miniature substations, distribution transformers and electrical enclosures.
NRS 089-4	Maintenance of electricity networks – Part 4: Control technology.
NRS 089-5-1	Maintenance of electricity networks – Part 5: Street lighting and high masts – Section 1: Maintenance of street lighting and high masts.
SANS 14001	Environmental management systems – Specification with guidance for use
SABS ARP5:2010/IWA 5:2006	Emergency preparedness

13.1 SUPPORTING DOCUMENTATION

The supporting documentation shall be established by the department.

- A set of Safe Operating/Standard Operating Procedures (relating to activities)
- Inspection sheets aligned to the different assets groups or installations
- Maintenance program/Schedule
- OEM equipment operating and maintenance manuals.

13.2 SUPPORTING ASSET MANAGEMENT SOFTWARE

The Electrical Asset Management (EAM) software will be set up to capture all assets, values, service life, maintenance plans, Operating Procedures. It will also generate the relevant works orders for planned maintenance.

The municipal resources include an installation of the Maximo Enterprise Asset Management (EAM) Software.

It does require further setups and population of the job/task descriptions for the various maintenance activities.

13.3 MAINTENANCE PHILOSOPHY

13.3.1 Planned / Preventative Maintenance

“Maintenance carried out at predetermined intervals or according to prescribed criteria and intended to reduce the probability of failure or the degradation of the functioning of an item”

This practise will be the default for medium- and high voltage switchgear, lines and cables, terminations battery chargers, protection relays, fire extinguishers, substation grounds and surrounds as well as servitudes.

Planned maintenance will be scheduled to maintain the equipment/installation in a condition of maximum availability of service.

Condition based maintenance will be based on scheduled inspection plans and lists.

Predetermined maintenance will be based on a given service schedule.

Both activities will comprise of cleaning, lubrication, adjustment, calibration, repair refurbishment or replacement as appropriate to the equipment or plant.

13.3.2 Refurbishment

“Reinstatement of items to their original condition and intended performance with consideration of cost and current technology for the purpose of extending the plants useful life”

Where it is considered cost effective and practical, the plant/equipment may be refurbished to extend its useful life. Due regard shall be given to the frequency of failures that the plant is experiencing. HV and MV switchgear are the most likely to be refurbished.

This would include the replacement of parts found to be worn or failed and affecting the prime function of the equipment.

13.3.3 Unscheduled / Corrective Maintenance

Unscheduled maintenance shall be done in the event of an unplanned failure, to return the equipment or plant to service as soon as necessary, but according to either of the following.

- **Immediate** maintenance shall be done and the equipment or plant returned to service.
- **Deferred** maintenance may be done if the plant / equipment can be safely returned to service for later scheduled maintenance. The need for service shall be escalated and tracked for earliest possible corrective action.

13.4 MAINTENANCE PLANNING

Maintenance plans will be developed to meet the requirements of this policy. The plans will contain details of:

- Inspections and record keeping;
- Frequency and time based schedules
- Be equipment specific
- Identify standard procedures.

- Cost and resource budget and reconciliation (supported through the EAM system)
- Availability of budgeted funds.

Maintenance plans shall only be approved by the Competent Person.

The maintenance frequency, activities, schedules, as approved; will be managed through the Maximo enterprise management system

13.5 MAINTENANCE WORK

Maintenance of electricity delivery networks shall only be performed by designated competent persons in terms of the departmental procedures as established in terms of paragraph 13.4

13.6 LEGAL REQUIREMENTS

The following acts and regulations of the Republic of South Africa shall apply.

- The Occupational Health and Safety Act, Act 85 of 1993 and Regulations.
 - The General Machinery Regulations 1988 (GMR) incorporated in the OHS Act.
 - Written appointments of the Competent Person in terms of the GMR, regulation 2(1)
 - Appointment of Authorised persons, conversant with the dangers and precautionary measures relating to the operation of machinery (regulation 4)
 - Operation of machinery (Regulation 4).
 - The Electrical Machinery Regulations (EMR) as amended.
 - The General Safety Regulations 1986 (as amended)

The following document shall be used for training and assessment of authorised persons for high voltage switching and operations.

- The Operating Regulations For High Voltage System (ORHVS) –Eskom controlled Document

13.7 CONSUMER REQUIREMENTS

The service levels of the electrical services shall be as agreed with the consumer in accordance with the NER Power Quality Directive.

It shall be specific to consumer and service areas and be subject to constraints identified in the system.

The quality of supply shall be defined in terms of the relevant part of NRS 047.

The service levels shall be defined in terms of the relevant part of NRS 048.

Each individual consumer shall enter into a contract defining the above.

All contracts/agreements shall be kept in a secure record system.

13.8 LIFE CYCLE COSTING

The requirement and scope of maintenance, selection of technology, energy losses or sales losses and spares/consumables relevant to any item shall be subject to a life cycle cost analysis and forecast.

13.9 ENVIRONMENTAL MANAGEMENT

All maintenance activities will be environmentally friendly and comply with SANS 14001.

Spills and leaks shall be reported to the relevant department for inspection, management and clean up.

13.10 QUALITY MANAGEMENT

A quality management system shall be established.

13.11 RISK MANAGEMENT

The Electricity Department shall maintain risk management to ensure safe electrical distribution systems for public, animal life, operators and maintenance personnel.

This shall include:

- Risk assessment of operations, equipment and service loss.
- Risk assessment before, during and on completion of maintenance work.
- Risk assessment and safe procedures in planning and executing maintenance work.

13.12 MODIFICATIONS AND RETROFITS

The definition of NRS 082 is quoted.

“Where substitutes are manufactured for items of a critical nature, recognized reverse engineering techniques can be used to ensure the substitutes are at least equal in all essential respects to the original.”

Reverse engineered designs may not infringe on any patent rights.

Reverse engineered items must be assessed for appropriateness of the design, including its function and operating conditions in the existing equipment. Where appropriate, designs, material selection and manufacture must be assessed by a qualified and competent person.

Records of alternatives applied must be entered into the record of the affected plant, including design records where applicable, approval, warranties and date of implementation.

Manufacturer's modification records for major plant or equipment shall be added to the asset data sheets for referral to, during maintenance and operation.

13.13 AUDITING

Any maintenance activity records may be audited for compliance.

An audit frequency shall be prepared.

14. MAINTENANCE MANAGEMENT SYSTEM

14.1 INFORMATION SYSTEM

The maintenance management system shall preferably be operated on an integrated platform with other municipal functions.

The maintenance management system must incorporate:

- A database of plant assets and it's relevant object parameters, including age, condition, expected life,
- Work procedures and plans for maintenance by plant item,
- Scheduling of maintenance and resources,
- Cost forecasting and capturing / reconciliation.

14.2 PERFORMANCE MONITORING

Maintenance KPI's will be set for each group of plant or function to allow review of expectations and actual service levels.

It should also support annual reporting data extraction for internal review and NERSA reporting.

ASSET MAINTENANCE STRATEGIES

Category	Type	Description
Planned	Periodic / preventative maintenance	Regular programme of maintenance tasks (including inspections). Inspection and service frequency
	Condition based / predictive maintenance	Maintenance based upon the condition of an asset.
	Service maintenance	Regular servicing of assets, including services prescribed by the original manufacturer.
Unplanned	Priority repair	Maintenance to restore the function of an asset that has failed.
	Run-to-failure or “Throw away”	Assets where no maintenance is performed and the asset is discarded and / or replaced at the end of its life.
	Corrective maintenance	Maintenance actions performed as a result of the failure of an asset based upon modifications and / or re-designs identified.